A Disaggregated Growth Diagnostic

Concept Note and Guidance on Implementation[1]

While the Growth Diagnostic methodology, as laid out by the (2005) seminal working paper by Ricardo Hausmann, Dani Rodrik, and Andres Velasco (hereon referred to as "HRV"), has offered the policy community a practical tool for rigorous evaluation of the challenges to economic growth in developing countries, a key shortcoming of the approach is its lack of guidance on evaluating the health of an economy's structure in addition to its aggregate state. This is particularly important for analysts concerned with the extent to which growth corresponds to poverty reduction and improvements in household welfare across income groups. This document proposes a disaggregated approach to the standard Growth Diagnostic methodology in order to expand the analysis from its current focus on aggregate growth to one that is better able to address the extent of such growth's inclusiveness.

The driving idea behind a disaggregation of the standard Growth Diagnostic (GD) tree of HRV is that sectors of production[2] are usually associated with households of a particular type (income, region, gender, etc.). For example the oil and mining sectors, being particularly capital-intensive, while generating large amounts of revenue for large businesses and governments, do not often expand employment opportunities for the poor. The agricultural sector is thought to be labor-intensive (although there are plenty of examples of capital-intensive commercial agriculture that would not generate significant job opportunities). There are numerous ways that one might disaggregate the GD tree -- in the extreme one may represent each individual household through his or her economic activity; however, the high cost of disaggregation makes it necessary for the analyst of the fast-moving policy world to disaggregate minimally and strategically.

The US Agency for International Development's Economic Growth (EG) Strategy of 2008 defines broad-based growth as growth that, "includes major income groups, ethnic groups, and women, and that significantly reduces poverty." The disaggregation undertaken by the approach described in this document, while maintaining a focus on these "target groups" defined by the most current USAID growth strategy, places strong emphasis on the reduction of poverty. From this perspective one may propose a slightly modified definition of broad-based growth as growth that, "reduces poverty overall and particularly where it is concentrated among women and particular ethnic groups."

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[2] The term, "sector," throughout this document is used from the perspective of the field of economics; that is, it refers to production or economic activity (ie., agriculture, manufacturing, services) rather than an often used reference to a development intervention category (ie., education, health, democracy and governance, etc.).

This document is divided into three sections. The first section presents the overall steps of conducting a disaggregated GD of the HRV type. The second section presents more focused guidance on the identification of production sectors that form the basis of the disaggregation. An appendix includes some supplemental tables as well as a detailed case example of using the presented tools to identify sectors of interest for the disaggregation.

1. A Disaggregated Growth Diagnostic, Overall Guidance

The following are notes on, roughly corresponding to steps to, conducting a strategically disaggregated Growth Diagnostic that evaluates a given economy's challenges to broad-based economic growth:

1. Conduct a thorough analysis of the recent state of growth in the subject economy. The analysis pushes beyond aggregate measures, looking at trends in growth rates across production sectors and in changes in incomes across household types (as defined by the 2008 EG Strategy). The analyst should highlight trends in the level and composition of poverty, identifying links between such trends and those in the economy's production structure. In order to do this, the analyst may want to begin by identifying who the poor currently are and who they have been historically.

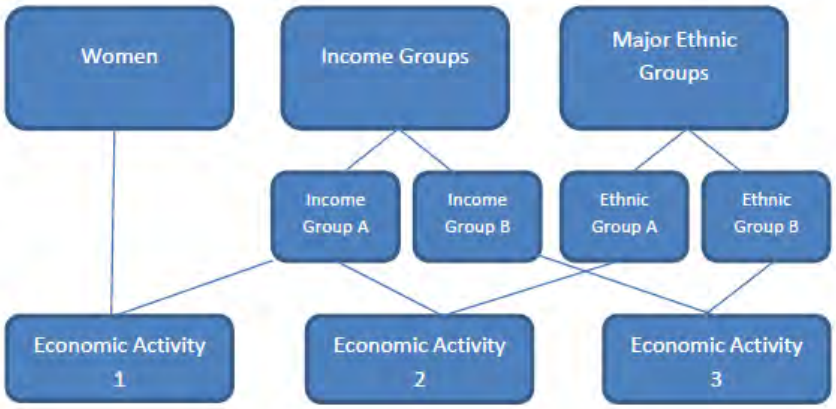
   In the context of poor availability and quality of data in which the USAID analyst works, it will be necessary to triangulate figures across the available data sources. The analyst should avoid reliance on one data source and should ideally use several. Data on sector-level production are often found in national accounts and social accounting matrices (SAMs), among other sources. Household budget surveys, as well as Demographic and Health surveys, will contribute to a disaggregated household welfare analysis.

   The importance of this first step cannot be understated – a thorough study of current growth, poverty, and income trends is required for the analyst to make a strong case for identifying particularly important production sector-household linkages (as described in the next step and in a later section) that will form the basis of the HRV tree disaggregation. This review should be sufficiently exhaustive to transform the analyst into an expert on the economic trends in the country under study.

2. Identify sectors of particular importance to inclusive growth (those with clearly strong linkages to the poor and other segments of society as described in the current USAID EG Strategy). These sectors will be different across countries. It is the task of the analyst to convince the reader, using (and not limited to) evidence uncovered in step 1, that the linkages chosen are particularly important for growth that is inclusive of the poor.

   To be able to identify such linkages, the analyst needs to become familiar with the "social structure of economic activity" – which groups work in which areas of the economy. The analyst

Figure 1: Setting Up A Disaggregated Growth Diagnostic



is not only concerned, however, with the production sectors in which target groups are located now, but in those production activities that show potential for growth and would utilize labor (or other factors) owned by the target groups. The identified production sectors will become the disaggregated sectors of focus in the subsequent GD analysis. The next section of this document provides more detailed guidance on how to identify these "inclusive sectors". The appendix offers a case example for the analyst interested in step-by-step instruction on applying one of the presented tools to identify sectors for subsequent analysis.

To avoid overburdening the analysis, disaggregation should be undertaken minimally and strategically, with a suggested maximum of 3 sectors of focus. One (hypothetical) example of a strategic disaggregation is of non-commercial (small-scale) agriculture, commercial agriculture, and manufacturing. The disaggregation may also be on a geographic basis (ie., agriculture in regions X, Y, and Z). The sectors chosen should ideally represent linkages to more than one target group of the population. Figure 1 illustrates the framework representing steps 1 and 2. The figure implies that focus sectors can be strongly linked to more than one of the target groups. In fact this is preferable.

3. After identifying the (up to 3) sectors of focus, the analyst proceeds with the inclusive Growth Diagnostic. The inclusive GD consists of an aggregate analysis identical to the standard HRV approach, in addition to which will be conducted a disaggregated analysis on each of the chosen production sectors of focus. At each decision node of the GD tree, the analyst will ask, "is this a binding constraint to growth," for the overall economy and for the (up to) 3 sectors of focus. Because this step of the approach incorporates the HRV approach, the analyst should refer to the literature on the latter for detailed guidance.[3]

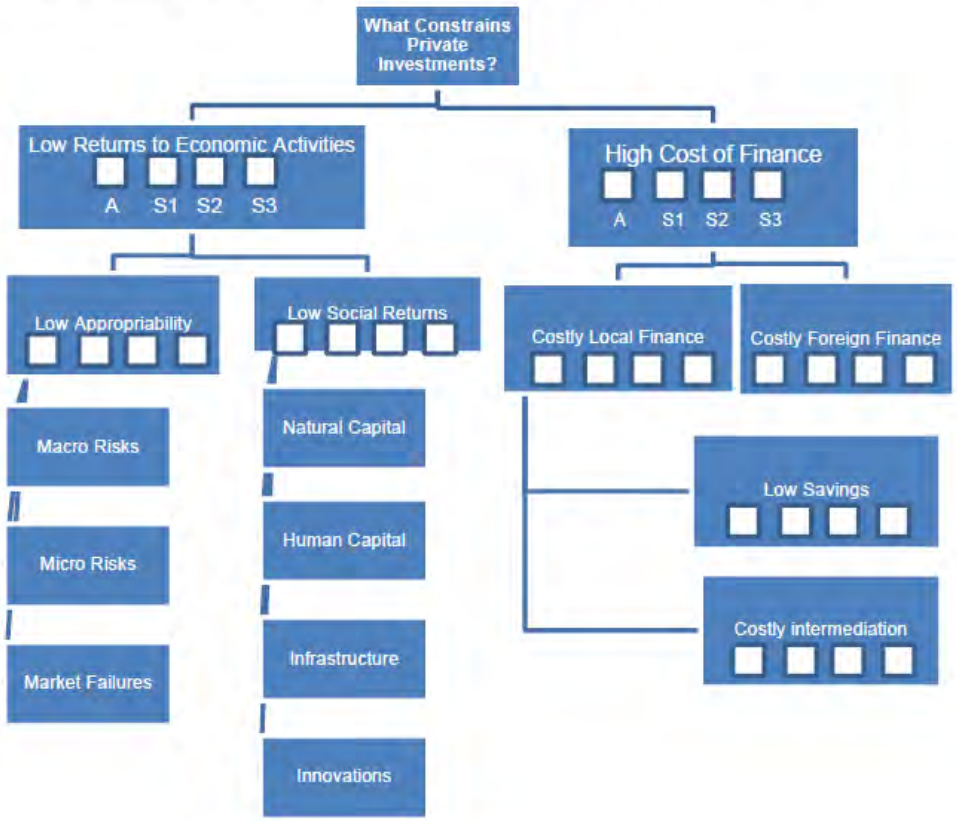
   While it may seem that disaggregating the HRV tree into up to 3 sectors amounts to performing 3 separate analyses, the expectation is that there are economies of scale that help to minimize

[3] See Hausmann et al. (2005) and Hausmann et al. (2008), among several others.

costs -- the disaggregated analysis will flow naturally from the analysis at the aggregate level. The sector analysis would rely on information from many of the same sources as the aggregate analysis and thus not be as burdensome as if one were to conduct an entirely independent analysis for each sector.

4. Using this disaggregated approach makes it possible that a constraint ruled out from one perspective (aggregate or sector level) may be kept open as a possibility for another. Such a case may be called, "uneven growth". Figure 2, based on the "tree" currently used by the Millennium Challenge Corporation, provides a diagram that may be used through the course of the analysis. The analytical team may indicate whether a binding constraint lies at a given node with a check mark in the appropriate check box at the node.

Figure 2: An Analytical Tree for a Disaggregated Constraints Analysis



5. The outcome of the analysis is a set of "most binding constraints to growth" from (up to) 4 perspectives: the aggregate level and the (as many as) 3 sector perspectives. While it is possible that the most binding constraints to growth differ across the chosen sectors of focus and across aggregate and sector approaches, it is expected that there be a significant level of overlap – <u>most binding constraints of the aggregate analysis, in general, should be "cross-cutting," impacting multiple sectors</u>.

6. The analysis aims at identifying the economic policy "levers" that should be pulled to unleash growth that is also inclusive of target groups. It does not and should not attempt to identify the reasons for which these levers have not been pulled already, a question that is best addressed by political economists and other experts. Not setting an appropriate boundary of the analysis will add unnecessary cost to the process.

7. Related to the previous item, it is important for the analyst or agency to identify a finite set of constraints that are allowable as an outcome of the analysis. For example, some would argue that *corruption* is an economic constraint that constitutes a most binding constraint to growth, while others would argue that corruption is an underlying non-economic constraint that helps to explain why the identified economic constraints exist.[4]

   The GD analysis described here is intended as an economic analysis in which the results are of an economic nature. There should be "policy levers" that are both clearly associated with and would be able to remove the identified binding constraint.[5] The explanation as to why such levers have not already been switched (reasons often found within political economy, institutional, or governance analysis) is beyond the scope of the growth diagnostic presented here.

The resources required to conduct this disaggregated inclusive growth diagnostic are greater than for the standard GD. While the standard GD may require 2 months of full-time work from a team of 4 quantitatively skilled analysts (8 person-months), the disaggregated version is estimated to require an additional 2 2/3 person-months per sector. The full version of the analysis, including both from the aggregate perspective and from that of 3 sectors, is thus estimated to require 16 person-months (4 analysts full-time during 4 months).

2. Identification of Sectors for Analysis

The approach described in this paper requires particular attention to the "setting up" of the HRV analysis. One may think of the overall approach as containing two parts – growth constraints are being identified using the HRV framework, while inclusiveness of such growth is being determined in an external framework that is used to select the appropriate sectors for subsequent HRV analysis. The overall analysis is concerned most with those constraints to growth in production sectors currently or potentially strongly linked to the chosen target groups (the poor, women, region, etc.). This section

[4] Others may not even consider corruption as a constraint at all; rather, it is a symptom, or an expression of underlying micro-economic constraints.

[5] Note that these policy levers are not limited to what some may view as traditional economic policy tools. For example, investing in primary school education may be considered educational policy; but, from an economist's perspective, an investment in human capital improvement has a direct effect on a country's aggregate production function and is thus clearly an economic policy.

provides guidance on this setting up of the HRV analysis, involving the identification of an appropriate set of focus sectors.

The income and well-being of households is intrinsically linked to the economic activities in which they are involved. This idea is no more complicated than the simple accounting equation (equation 1) that one might find in a computable general equilibrium (CGE) model and represented in a social accounting matrix (where Y(h) is income of household h, w(j) is the wage rate in sector j, and L(j,h) is the labor provided by household h to sector j):

Equation 1: Household Income Accounting Equation

$$Y_h = \sum_j w^j L_h^j$$

The current USAID EG Strategy explicitly identifies the "h" in which we are interested: various income groups, various ethnicities, and women.[6] Our task is thus to identify the sectors (j) that are most linked to households of focus, h (where h refers to income groups, ethnicities, and women).

However if we limit the exercise to one that looks only for the *currently* strong sector-household linkages, we risk producing recommendations for interventions in sectors whose economic potential has already been attained and neglecting sectors that both represent real growth opportunities and are shown to utilize the labor of our groups of interest. The exercise of identifying sectors of analytical focus thus contains two parts:

1. Identifying <u>current</u> linkages between sectors and target households, and
2. Identifying <u>future</u> linkages between potential growth sectors and target households
    a. Identifying sectors of comparative advantage
    b. Identifying sectors of comparative advantage that would be strongly linked to target households.

The first component is quite straightforward – the analyst searches for evidence in the recent data for linkages between production sectors and target households. Social accounting matrices, when they exist for a country, can provide strong evidence for these linkages. Box 1 provides an example of how one might use a SAM (one for Chad constructed in Garber, 2009, and shown in figure A.1) in the identification of current production-household linkages.

[6] Although the cited EG Strategy document defines broad-based as referring to income groups, women, and poor, this document assumes that the intended primary target group is the poor, particularly where women or given ethnic groups are disproportionately impacted.

The second component, identifying strong linkages between target groups and potential growth sectors, is more challenging. It involves first identifying sectors of comparative advantage, and then making a case that these sectors would demand factors (in general, labor) owned by target households. The remainder of this discussion reviews tools that the analyst may want to consider using in attempting to identify these future linkages. The review is not exhaustive and not intended to limit the analyst who is encouraged to approach the exercise as a research economist would do – (s)he may make use of a wide array of techniques to demonstrate the production-household linkages but likewise must be able to justify these techniques to the audience of the work.

Box 1: Using a Social Accounting Matrix to Identify Production-Household Linkages

As an example of how one might use a SAM to identify the strong current linkages between production and households, suppose we are interested in identifying the production sectors most strongly linked to the "urban wage earner" households of the Chad SAM shown in figure A.1 in the appendix. We can see from the 2nd page of the figure that roughly ½ (23.62) of this household group's income comes from its "sales" of what the SAM calls "privileged labor," the other half (26.54) from "non-privileged labor." It is also worth noting that urban wage earner households represent 29.3% of total privileged labor factor payments in the economy, while they make up only 4.4% of the Chadian population (see Garber, p. 126). The group receives only 5.3% of total economy-wide payments to "non-privileged labor".

As a next step the analyst might look at factor payments by production sectors represented in the SAM (page 1 of the figure). Since urban wage earner households by definition are not involved in rural activities, the analyst may want to focus on the non-rural non-government production sectors (usually the secondary and tertiary sectors of an economy). Factor payments from these remaining sectors to privileged labor sums to 32.2 billion FCFA, while those to non-privileged labor sums to 146.3 billion FCFA. The services sector is the largest user of privileged labor, representing 71% of non-rural, non-public, factor payments to the category. The services sector is also the largest payer to non-privileged labor, with the informal manufacturing sector also a significant user of this category of labor. However, one can notice that production in the services sector is not *intensive* in its use of non-privileged labor, while more than ½ of factor payments made by the informal manufacturing sector is made to non-privileged labor.

The information contained in the Chad SAM may not be sufficient, in and of itself, as a basis on which to make the conclusions required to identify the sectors of the subsequent HRV analysis. For one, the sectors shown in the SAM may be too highly aggregated for use in the HRV exercise. However, the SAM points the analyst in a direction worth further investigation – in this example, it would seem appropriate to look further into the services sector to identify its components and which of these contributes most significantly to the incomes of target households (in this example, urban wage households). In addition the SAM here provides some valuable information about the structure of the Chadian economy: assuming that household categories remain unchanged, a relatively small segment of the Chadian population (4.4%) would receive 29.3% of the wage payments generated by growth in sectors using privileged labor, 71% of which is currently represented by the services sector.

2.1 Identifying Comparative Advantage Sectors

To claim that an economy has an innate comparative advantage in producing something that it does not currently widely produce may seem somewhat of a contradiction. The intention of such a statement is that removing certain distortions from an economy would "unleash" the natural comparative advantage from which an economy is currently not benefiting. The concept of comparative advantage, however, is difficult to separate from distortions that are brought about by the policy and institutional environment. Such distortions increase (or sometimes decrease) production costs just as the lack of a particular type

of soil or category of labor would. In addition if an apparent "natural" (non-policy) comparative advantage exists in a particular economic activity that is buried under a plethora of "artificial" (policy) distortions, it is of questionable use to propose that the economy has a "comparative advantage" in the activity if there is little prospect of such artificial distortions being removed. This being said, we will limit the discussion of comparative advantage here to its natural aspect – that which a country holds barring policy and institutional distortions. This is, in fact, the appropriate question to ask at this stage since the goal of the next stage, the HRV Growth Diagnostic, is to identify those constraints that have prevented the given economy from benefiting from its natural comparative advantage.

There are at least two main categories of techniques used to identify goods[7] for which an economy holds a comparative advantage. Domestic Resource Cost (DRC) Analysis and Social Benefit Cost (SBC) Analysis constitute a set of approaches (hereon referred to as Social Profitability (SP) analysis) that aim to identify comparative advantage based on the social profitability of engaging in a given activity. The SP approach is forward-looking in that its primary question is on the social profitability of a potential production activity. In contrast the Revealed Comparative Advantage (RCA) set of approaches relies on current export data as evidence of the extent of an economy's comparative advantage in the production of a given good.

There is little agreement on which set of approaches is generally preferable. The SP approach is arguably the more rigorous of the two, a detailed exercise of mapping the economic impact of the potential production of each good in question. The approach is analogous to a cost-benefit analysis of a proposed project. Its focus on potential production on a good not yet produced is attractive. However the USAID analyst will not usually have the luxury of time to conduct an SP analysis on several products, and certainly not simply as a pre-cursor to the subsequent HRV analysis. Beyond the time required by the SP approach, the exercise relies heavily on data that may require collection.

The RCA set of approaches is attractive for its reliance on more readily available data than is needed by SP analysis. Some may also prefer its evidence-based nature – it uses evidence of current export patterns to reveal comparative advantage. Among the earliest uses of an RCA index (of which there are now many), and arguably still the most widely used, is the Balassa Index (shown in equation 2). The index is a ratio between a country i's export market share in good j and its export share in all exports. A value greater than one implies that the good's production is more competitive than is the country's overall export basket. The country is thus revealed to possess comparative advantage in that good. An index value less than one implies the opposite.

A weakness of the RCA approach may be that (in general), while it is well able to reveal the comparative advantage that an economy currently possesses, it says little about production possibilities. If our goal in this setting-up step of the Growth Diagnostic is to identify a potential growth sector, we require an approach that concerns itself with future production potential. One strand of the RCA approach that

[7] "Goods" is used interchangeably with "goods and services" throughout the document.

does indeed concern itself with future production possibilities is found in Hausmann and Klinger (2006) whose details will be discussed in the following section.[8]

The analyst is encouraged to use elements of both SP and RCA approaches to identify the potential growth sectors for subsequent disaggregated HRV analysis. Given the time constraints of the analyst it is recommended that (s)he does not carry out an independent SP analysis, rather relying on the wide literature that already exists. The analyst is encouraged to use the approach laid out by Hausmann and Klinger (hereon referred to as the Product Space Approach) as the RCA component of sector analysis. The analyst can then use findings from SP analysis in the literature to substantiate the results of the independently conducted RCA analysis.

Equation 2: Balassa RCA Index

$$RCA_{ij} = \frac{s_{ij}}{s_i}$$

$$where$$

$$s_{ij} = \frac{xval_{ij}}{\sum_{k, i \in k} xval_{kj}}$$

$$s_i = \frac{\sum_j xval_{ij}}{\sum_k \sum_j xval_{kj}}$$

i, k are exporting countries

j = export product

2.2 The Product Space Approach to Revealed Comparative Advantage

To search for the activities in which an economy has a natural comparative advantage, it is useful to look at current production activities. As Hausmann and Klinger (2006) point out, "established industries somehow have sorted out the many potential failures involved in assuring the presence of all of (these) inputs," that are highly specific to production of a particular good. These include knowledge, physical assets, intermediate inputs, labor training requirements, infrastructure needs, property rights, regulatory requirements, and other public goods. If one accepts the assumption that potential production activities that are similar or "close to" current activities require inputs that are similar, then it is not a risky proposition that it would be easier for an economy to move into such similar production activities rather than into those that are dis-similar or "far away from" the current set of activities.

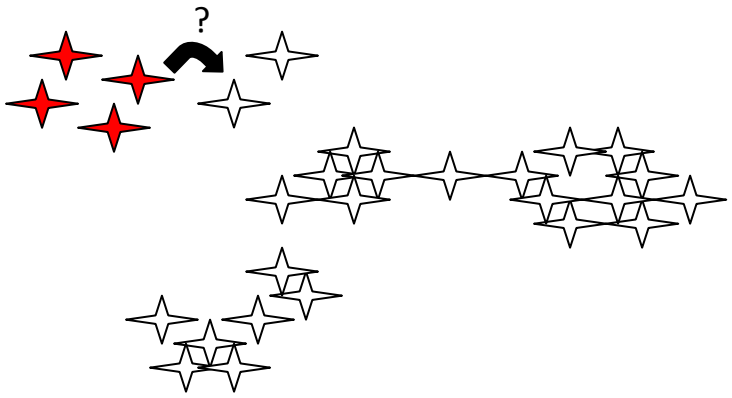
[8] The approach first popularized in Hausmann and Klinger (2006) is based on the previous work of Hausmann, Hwang, and Rodrik (2005).

Hausmann and Klinger develop a method of mapping all potential production activities into a product space according to how close or far they are from each other, this distance based on probabilities that any given pair of goods is exported together by a country holding comparative advantage in either of the goods. The principal idea is that if evidence shows a high likelihood of a country having comparative advantage in one good <u>if</u> it has comparative advantage in a different good, then the goods must be "close" to each other in this product space.

Note the HK product space is one that has general application rather than being country-specific – each country's economy is located somewhere in this product space. They present the following useful analogy – the product space is a forest, production activities are trees, and firms are monkeys. The forest is a fixed space. Some trees are close to each other (dense areas of the forest) while there are also sparse areas. Not all trees are currently occupied by monkeys. It is easier for monkeys to jump between trees that are close to each other than between those that are far away from each other. Monkeys will only take the risk of jumping to a new tree if that tree is sufficiently better in some way.

Any given economy can thus be described by the location of its firms in the production space, both in its dense and sparse areas. A hypothetical economy's location in a hypothetical product space is shown in figure 3. The economy is represented by the colored stars, a cluster of activities that is located somewhat far from the other major clusters of production activities that exist. Firms in this economy will only jump to the next closest activities if those activities are sufficiently close to the current activities (ie., innovation costs are not prohibitively high) and if the returns from the new activity justify the cost (including risk) of jumping.

Figure 3: A Hypothetical Product Space ("Forest")



The authors rely on two measurements useful to their (and our own) discussion. Each product in the space can be valued by the levels of GDP in countries that hold revealed comparative advantage in that product, an average weighted by the respective countries' Balassa RCA index for the good. The measurement, which the authors refer to as PRODY, can be thought of also as a measurement of the level of sophistication of an exported product, with more sophisticated products generally being exported by wealthier countries. Each country's export basket can then be valued as a weighted average of the PRODY measurements of the basket's components, a measurement that they refer to as EXPY. Thus each product in the global market is associated with a PRODY value, each country associated with an EXPY value.

The theory they present and test is that the likelihood of producers "jumping" from one production activity to another is primarily dependent on two factors – the distance of the potential activity from current activities and the extent to which the potential activity is "valuable," as measured by PRODY, relative to the value of the current set of activities (as measured by EXPY). This distance of a potential production activity to current export production activities is called the former's *density*. The density, a product- and country-specific value whose calculation is shown in equation 3, ranges from 0 to 1.[9] Higher values indicate a "dense" area around the potential product, implying potential comparative advantage in the product.

Equation 3: H-K Density Measure

$$density_{i,c,t} = \left(\frac{\sum_k \varphi_{i,k,t} x_{c,k,t}}{\sum_k \varphi_{i,k,t}} \right)$$

This basic information on the Product Space Approach now allows us to discuss an innovative application to our current exercise of identifying potential growth sectors for subsequent HRV analysis. Note that Growth Diagnostics is concerned primarily with short-to-mid term growth. This implies that the analyst should avoid focusing on production activities that are "far away from" activities currently undertaken, those that are only likely to become potential growth sectors far into the future. The goal of identifying potential growth sectors also implies avoiding lower-value activities (those with a PRODY value smaller than the economy's EXPY value).

We are thus concerned in our Growth Diagnostic Analysis with identifying high value activities not currently widely undertaken and that are close to the currently undertaken activities in the production space. Our central question in the subsequent HRV analysis would be, if a high-value production activity

[9] The expression in equation 3 should be understood as the sum of distances between a given product and the goods that currently comprise the country's comparative advantage basket divided by the sum of distances between that product and all products in the product space.

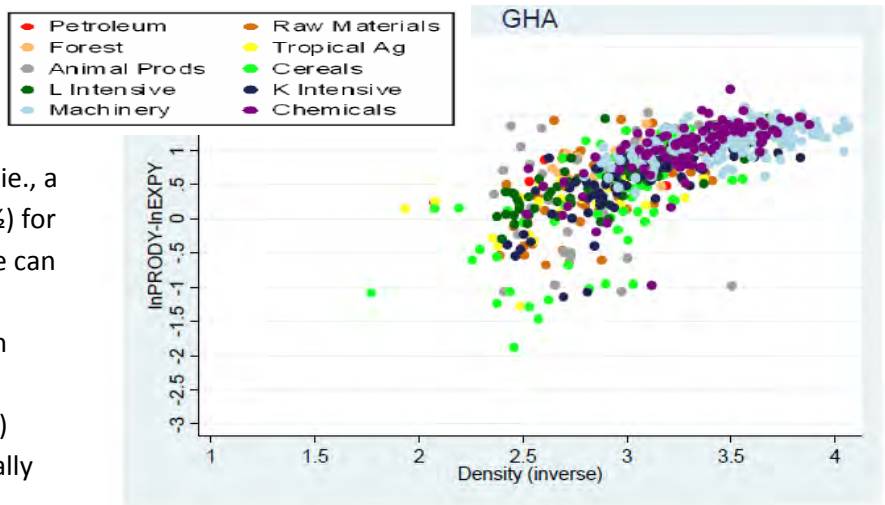
exists that is similar to currently undertaken activities (and therefore to which it would be less costly to transition), what are the binding constraints that are preventing a transition from taking place?

2.2.1 Application of the Product Space Approach

Here we present a set of steps for using the Product Space approach to inform the identification of growth sectors for the subsequent HRV analysis. The steps are provided as guidance to the analyst who prefers some amount of explicit direction – they are not intended to limit the analyst who sees an alternative method of applying the Product Space (or a different) approach. In addition the reader will find in the Appendix a detailed discussion of the application of the Product Space tools to sector identification, using Kenya as an example.

We are interested in identifying potential production activities that are "close to" current activities (have a density measurement of closer to 1) and that have a high relative value – a high PRODY value in comparison to the country's EXPY value. Hausmann and Klinger (2006) plot, for various countries, the inverse of the density measurement against the difference between the PRODY and EXPY indices for all goods not widely exported, a plot they call the *Open Forest*. The Open Forest illustrates the value and the level of attainability of all of the products in the product space for a given economy. Figure 4, showing this scatter plot of potential activities for Ghana, is extracted from their 2006 working paper.

Figure 4: Open Forest of Potential Production Activities, Ghana



The diagram shows that Ghana's "open forest" is quite sparse. The inverse density measure of potential production activities is greater than 2 (ie., a density index of less than ½) for all but a few products. One can also note that the "highest value" potential production activities (as shown by the highest values of ln(PRODY) minus ln(EXPY)) are generally the most distant from the current position of the production economy.

The analyst can use such a figure (or simply the values that underlie the figure) to identify the (1-2) potential growth sectors that would become subject to subsequent HRV analysis. For example, in the Open Forest figure for Ghana, the analyst may want to consider the cluster of five activities whose option value is greater than zero and whose inverse density is smaller than 2.25. Alternatively the

analyst may want to consider looking at activities slightly further away (inverse density between 2.25 and 2.5 but that are closer to other potential production activities that could be more easily undertaken in the future[10]. The analyst must use his or her best judgment, remembering that the goal is to choose sectors towards which the economy should already have been moving given their respective higher values (measured by PRODY) and short distances to the current production location.

The USAID analyst should aim to construct a similar plot, noting that the HRV analysis calls for a more highly aggregated version of what is shown in figure 4 – ideally, the subsequent HRV analysis will not focus on a specific product but an entire set of products aggregated under a sector category.[11] To do this we need to access the EXPY index for the given country, the PRODY index for potential production activities (ideally, aggregated into somewhat aggregated production sectors), and the country-specific density measurements indicating the distance between the potential production activities and current activities. In sum:

- The analyst should attempt to access the most recent EXPY index of the country under study (one value), the most recent set of PRODY indices available (one value for each product), and the density measures of potential production activities (those not already undertaken in the country under study, thus a set of country-specific values for each product).

- Although it is likely that the analyst will have access to most of this information, (s)he will need to construct any missing indices.[12]

- With all three measurements the analyst may construct a scatter plot similar to that found in figure 4. While the plot is not necessary for being able to identify sectors for HRV analysis, it provides the reader of a subsequent report a useful illustration of a country's production possibilities.

- With the EXPY, PRODY and density figures, the analyst is in a position to identify sectors for HRV analysis:

[10] The Open Forest diagram is unable to tell us how close two products are to each other, although in most cases their distances from each other in the Open Forest would correlate with their distances to each other in the Product Space. The analyst may find the universal distance values between any two products in data files readily obtainable by USAID.

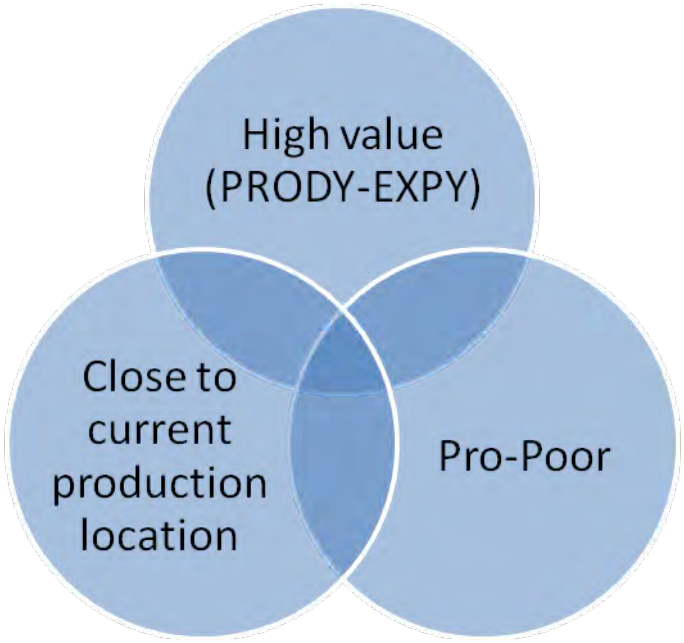
[11] This higher level of aggregation may not be possible in practice when the analyst has access to only EXPY and PRODY numbers based on 4-digit SITC product codes. However products at the 4-digit level can be grouped by 2-digit SITC "divisions" to help identify patterns among similar products.

[12] The PRODY measure can be used for multiple cases once it is constructed. Use of the U.N. Comtrade database is suggested for constructing PRODY. Once a set of PRODY values is available, it is relatively simple to calculate a single EXPY value for any given country. The product-specific density values, however, need to be constructed on a country-by-country basis when not already available for the country under study.

- Identify products that are relatively close to the current location in the production space (high density products), while attempting to identify those that also seem close to products to which the economy may subsequently jump in the future.
- Among those relatively close products, identify those that are relatively "valuable" – those with a positive value for the difference between PRODY and EXPY.
- As the HRV analysis will focus on those sectors that would provide income-earning opportunities for the poor, among those products/sectors identified thus far, locate those that are generally more intensive in the use of factors owned by the poor (in general, "unskilled" labor).
- If the available data (indices) are only available at the 4-digit SITC code level, attempt to choose clusters of similar products (such clusters represented by SITC "divisions") rather than specific detailed products.

The intersection of regions in the diagram of figure 5 represents the set of production activities that would qualify for subsequent HRV analysis. The activities must be "close to" current activities. They must be more valuable that current activities. They must be intensive in their use of factors owned by target households.

Figure 5: Criteria for Production Sector Selection



2.3 Social Profitability Analysis

Attempts to assess the comparative advantage that a given country possesses in the production of a good have fallen into two categories. The Product Space approach already detailed falls into the

Revealed Comparative Advantage (RCA) category.[13] The other category of approaches, referred to here as Social Profitability Analysis, includes Domestic Resource Cost (DRC) social benefit-cost (SBC) approaches. The SP approach measures the comparative advantage of a potential production activity as the social profitability of engaging in that activity. While this guidance document strongly suggests against undertaking an independent SP analysis (for reasons described in the following section), rather drawing information from a thorough literature review, it is beneficial for the analyst to be familiar with basic concepts of SP approaches.

The DRC indicator is defined as the shadow value of non-tradable inputs of an activity per unit of tradable value added. The relationship is shown in equation 4 in which the domestic resource cost of good j in country i is the ratio of the unit cost in domestic inputs of producing the good and the unit domestic value added of the good (price received minus imported input unit costs). Prices used should be shadow prices, resulting from purging policy and other distortions from observed prices. A DRC ratio value of less than one indicates a level of comparative advantage in the good's production as the domestic opportunity cost is less than the domestic value added of producing the good. While there is criticism of the DRC method based on, among other things, the particular focus on non-tradable inputs in the analysis, it remains a widely used and accessible tool to compare the potential comparative advantage of more than one activity.[14]

Equation 4: Domestic Resource Cost Indicator

$$DRC_j^i = \frac{c_j^i}{p_j^i - c_j^m}$$

The DRC index in equation 4 is derived from a simple relationship shown in equation 5: the net social profit of producing a quantity of a given good is equal to the revenue it generates less the value of non-tradable and tradable inputs used in production. To arrive at the DRC index, one would isolate the terms representing non-tradable inputs and divide by revenue minus the value of tradable inputs.

[13] Revealed Comparative Advantage approaches use ex-post information on production patterns to infer information about comparative advantage.

[14] Masters and Winter-Nelson (2005) show that when using the DRC measure the first order conditions for (social) profit maximization do not generally hold and thus it is not guaranteed that a ranking of production activities based on DRC indices would necessarily reveal the most socially profitable activity. It is outside the scope of this document to dissect this argument, and the interested reader is encouraged to consult the article.

Equation 5: Net Social Profit

$$NSP(Q) = P_Q Q - P_N N - P_T T$$

where T=tradables, N=non-tradables, Q=output

Equation 5 can be alternatively manipulated to derive the *Social Benefit Cost Index*. This is accomplished by isolating all terms related to cost on one side of the equation and dividing both sides by revenue. The resulting SBC index is shown in equation 6. Like the DRC index profitable activities have an SBC index value of between zero and one. The SBC index, unlike the DRC index, cannot take on a negative value. The reader can verify this independently by manipulating equation 5. Note that the calculation of the SBC index does not require classifying costs as tradable or non-tradable (the numerator is simply the total cost of inputs), whereas calculation of the DRC index does require this categorization, a distinction identified by Masters and Winter-Nelson that favors the use of the SBC index over the DRC index.

Equation 6: Social Benefit Cost Index

$$SBC(Q) = \frac{P_N N + P_T T}{P_Q Q}$$

2.3.1 Application of SP Analysis

The reader is discouraged from conducting an independent SP analysis. The product of an SP analysis, a measure of the social profitability of potential production of a particular good or group of goods, does not offer a sufficiently wide perspective for the analyst to identify appropriate sector(s) for subsequent HRV analysis. The analyst will not have sufficient time to cover a wide enough selection of products through independent analysis. Rather, the analyst is encouraged to conduct a "meta-analysis" of SP literature for the country of focus. The meta-analysis will cover a wider area of the product space than would be accomplished through a detailed product-specific analysis; and, it can also be used to support or question the results of the Product Space analysis. The analyst is encouraged to proceed in the following order:

1. Conduct independent Product Space analysis
2. Conduct a meta-analysis of SP analyses with a particular focus on comparative advantage goods identified by the Product Space analysis

The SP analytical literature is too vast to cover here; but, it is worth noting that a simple search on USAID's Development Experience Clearinghouse (http://decserach.usaid.gov) of domestic resource cost analysis in Africa yields more than 300 reports.

It is important for the reader to keep in mind that the methods discussed in this document to identify comparative advantage sectors will result in the choice of only one or two sectors for subsequent HRV analysis. The remaining sectors will be those where USAID's target households are currently located in the product space. Thus the search for potential growth sectors, while rigorous, should not be so exhaustive that it becomes the focus of the overall analysis. Related to this idea, our end goal is not to identify sectors worthy of external assistance; rather, it is the identification of the binding constraints that prevent the advancement of the parts of the economy on which USAID's target households financially depend.

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Figure A.1: Excerpts from A Social Accounting Matrix (SAM) for Chad (Garber, 2009)

		Non-Cotton Agriculture	Cotton Crops	Livestock	Fish, Forest, Mines	Non-Cotton Non-Oil Man	Cotton Fiber	Oil Development	Construction Public Works	Informal Manufacture	Services	Govt	TOTALS
Activities	Non-Cotton Agriculture												
	Cotton Crops												
	Livestock												
	Fish, Forest, Mines												
	Non-Cotton Non-Oil Man												
	Cotton Fiber												
	Oil Development												
	Construction and Public Works												
	Informal Manufacture												
	Services												
	Govt												
Commodities	Non-Cotton Agriculture	14.06	1.64	0.03	0.00	5.28	0.00	0.00	0.02	0.82	24.08	0.00	45.92
	Cotton Crops	0.00	0.00	0.00	0.00	0.00	27.50	0.00	0.00	0.00	0.00	0.00	27.50
	Livestock	8.25	0.73	0.00	0.00	72.11	0.00	0.00	0.00	1.18	0.00	0.00	80.26
	Fish, Forest, Mines	0.00	0.00	0.00	1.53	0.21	0.00	0.00	12.10	1.41	2.44	0.84	18.51
	Non-Cotton Non-Oil Man	11.40	1.33	8.69	1.86	94.16	0.00	3.98	19.39	36.69	109.59	47.17	294.27
	Cotton Fiber	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Oil Development	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Construction Public Works	0.00	0.00	0.10	0.00	0.53	0.00	3.98	0.52	0.00	1.14	1.83	8.11
	Informal Manufacture	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.60	0.00	0.00	11.60
	Services	0.00	0.00	3.33	0.00	3.19	5.09	7.96	10.44	3.25	73.42	29.85	136.53
	Govt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.22	0.01	0.29
	TOTAL	31.71	3.69	12.14	3.39	135.50	32.59	15.93	42.53	54.95	210.89	79.70	623.00
Factors	Land	20.27	2.80	52.80	3.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	79.12
	Capital Formal	0.00	0.00	0.00	0.00	12.50	4.24	1.65	5.28	0.00	35.72	38.49	97.88
	Capital Informal	0.00	0.00	0.00	0.00	6.74	0.00	0.00	2.57	23.38	164.32	0.00	197.00
	Labor Priveleged	0.00	0.00	0.00	0.00	4.08	0.90	0.28	4.19	0.00	22.74	49.17	81.35
	Labor Non-Priveleged	149.23	20.60	123.20	29.25	1.18	0.26	0.28	2.86	37.84	103.92	30.14	498.75
Total Factors		169.50	23.40	176.00	32.50	24.50	5.40	2.20	14.90	61.20	326.70	117.80	954.10
Current Accounts													
Households	Rural Ag												
	Rural Pub												
	Urban Inf												
	Urban C-R												
	Urban Pub												
	Urban Wage												
Total Households													
Enterprises													
Oil													
Government		0.19	0.03	0.18	0.03	0.15	0.04	0.02	0.05	0.11	0.51	0.19	1.50
Capital Accounts													
Households	Rural Ag												
	Rural Pub												
	Urban Inf												
	Urban C-R												
	Urban Pub												
	Urban Wage												
Total Households													
Enterprises													
Oil													
Government													
Total Capital Accounts													
ROW													
TOTALS		201.40	27.12	188.32	35.92	160.15	38.03	18.15	57.49	116.26	536.10	197.68	1578.60

Figure A.1, p.2

		Facotrs							Households						
		Land	Capital Formal	Capital Informal	Labor Priveleged	Labor Non-Priveleged	Total Factors	Current Accounts	Rural Ag	Rural Pub	Urban Inf	Urban C-R	Urban Pub	Urban Wage	Total
Activities	Non-Cotton Agriculture														
	Cotton Crops														
	Livestock														
	Fish. Forest, Mines														
	Non-Cotton Non-Oil Man														
	Cotton Fiber														
	Oil Development														
	Construction and Public Work														
	Informal Manufacture														
	Services														
	Govt														
Commodities	Non-Cotton Agriculture								138.80	17.42	21.29	5.22	19.75	17.32	219.80
	Cotton Crops								0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Livestock								8.55	13.77	0.00	0.00	0.00	0.00	22.32
	Fish. Forest, Mines								8.07	1.60	4.32	2.81	6.13	3.21	24.93
	Non-Cotton Non-Oil Man								58.90	11.91	32.23	25.56	41.26	20.63	191.49
	Cotton Fiber								0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Oil Development								0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Construction Public Works								0.81	0.16	0.81	0.52	0.68	0.41	3.38
	Informal Manufacture								40.00	7.50	13.00	11.00	18.00	9.00	98.50
	Services								66.17	12.82	8.96	6.79	11.43	7.23	113.40
	Govt								0.32	0.07	0.81	0.52	0.48	0.47	2.68
	TOTAL							TOTAL	322.82	85.25	81.42	52.23	98.73	58.27	676.52
Facotrs	Land														
	Capital Formal														
	Capital Informal														
	Labor Priveleged														
	Labor Non-Priveleged														
Total Factors															
Current Accounts															
Households	Rural Ag	35.00	0.00	25.58	0.00	234.99	295.55		35.88	1.67	3.80	2.44	5.05	2.29	51.12
	Rural Pub	9.12	0.00	0.00	22.79	36.76	68.67		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Urban Inf	0.00	0.00	15.91	0.00	75.03	90.93		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Urban C-R	0.00	0.00	10.20	0.00	48.12	58.33		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Urban Pub	0.00	0.00	0.00	34.95	77.31	112.26		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Urban Wage	0.00	0.00	0.00	23.62	26.54	50.16		0.00	1.67	3.80	2.44	5.05	2.29	15.24
Total Households		44.12	0.00	51.67	81.35	498.75	675.89	918.35	35.88	3.33	7.60	4.88	10.09	4.57	66.36
Enterprises		35.00	72.43	133.03	0.00	0.00	240.46								
Oil															
Government		0.00	8.30	0.00	0.00	0.00	8.30		15.10	2.01	0.00	0.00	4.28	2.35	23.74
Capital Accounts															
Households	Rural Ag								-16.50						-16.50
	Rural Pub									-0.12					-0.12
	Urban Inf										2.22				2.22
	Urban C-R											1.42			1.42
	Urban Pub												3.83		3.83
	Urban Wage													1.59	1.59
Total Households									-16.50	-0.12	2.22	1.42	3.83	1.59	-7.76
Enterprises															
Oil															
Government															
Total Capital Accounts															
ROW		0.00	17.15	12.30	0.00	0.00	29.45								
TOTALS		79.12	97.88	197.00	81.35	498.75	954.10		357.10	70.47	91.24	58.52	114.72	66.78	758.85

A.2 The Product Space Tools to Identify Potential Growth Sectors, The Case of Kenya

This section is a step-by-step guide on the application of the product space tools to the identification of 1-2 "potential growth" sectors that could potentially form the basis of a disaggregated HRV exercise. It uses data generously provided by the World Bank to investigate the product space of Kenya.

Step 1: Gather the data. There are three sets of data to be used in the exercise:

1. the single EXPY value for Kenya.
2. The set of PRODY values, 1 for each product at the SITC 4-digit level (approximately 800).
3. The set of density values, 1 for each product at the SITC 4-digit level for Kenya (approximately 800).

As the data provided to USAID on the PRODY measure uses the 2005-2009 average, both EXPY and density should also reflect average values over the same 5 year time period.

Note that theoretically the analyst is theoretically able to reproduce these data sets herself. Construction of the PRODY measure requires the calculation of countries' Balassa RCA indices (eq. 2) for each product and the GDP figures for each country. Calculation of EXPY is a weighted average using the PRODY values. The density measure is calculated from the universal product space distance values which could themselves also be calculated. Fortunately the USAID analyst should have easy access to values for EXPY, PRODY, and density, and will avoid any complex research.

The 2005-2009 average EXPY value for Kenya is $US 7,925. The EXPY for the Dominican Republic, another country currently participating in a pilot Growth Diagnostic exercise, is $US 11,483.

Step 2: Organize the data for use in the Open Forest diagram

The Open Forest diagram maps each of the products into a space showing their respective distances to the country's current comparative advantage basket in addition to their values relative to the current basket. Distance is measured by the density value (eq. 3). Relative value is measured by comparing the products' PRODY values with the country's EXPY value.

This guidance (following the practice of Hausmann and Klinger, 2005) suggests using the *inverse density* for distance, such that the larger the value, the further away the product is from the current comparative advantage basket. Inverse density will be plotted on the horizontal axis. The analyst is also advised to calculate the relative value of each product as ln(PRODY) – ln(EXPY), which will be plotted on the vertical access.

The analyst will want to create a single worksheet in which is shown (at a minimum) each product's SITC 4-digit number, its name, its PRODY value, and its density value. An sample of the example for Kenya is shown in figure A.2. The analyst will create a column showing the value ln(PRODY)-ln(EXPY) for each

product and another column showing the inverse of the density values. It may later add value for later use to insert columns showing the SITC 2-digit code (representing the SITC "division") and the SITC 1-digit code (representing the SITC "section").

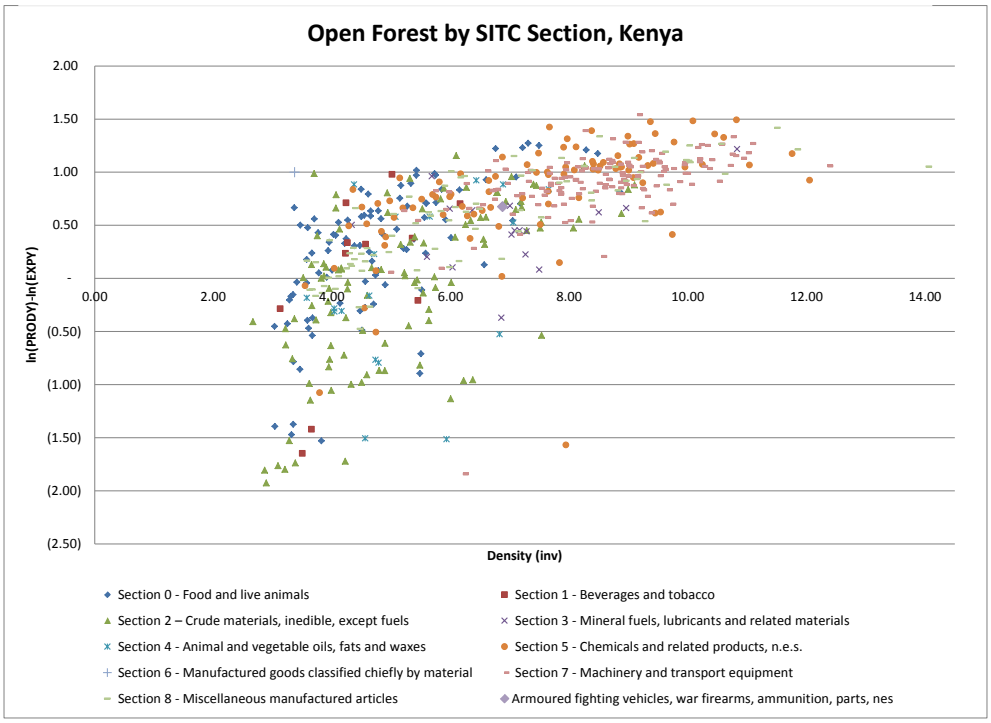
Figure A.2.: Organizing Data for the Open Forest Diagram

SITC 4-digit		SITC Division		SITC Section					
						PRODY (2005-	ln(PRO	density	inverse
1110	Non-alcoholic beverages, nes	11	Beverages	1	Section 1 - B	10,029	0.24	0.236	4.23
1124	Distilled alcoholic beverages, nes	11	Beverages	1	Section 1 - B	10,924	0.32	0.219	4.57
1123	Beer made from malt (including al	11	Beverages	1	Section 1 - B	11,083	0.34	0.235	4.26
1121	Wine of fresh grapes etc	11	Beverages	1	Section 1 - B	11,560	0.38	0.187	5.36
1122	Other fermented beverages, nes (	11	Beverages	1	Section 1 - B	16,000	0.70	0.162	6.16
1212	Tobacco, wholly or partly stripped	12	Tobacco and tobacco manufac	1	Section 1 - B	1,525	(1.65)	0.286	3.50

Step 3: Construct the Open Forest Diagram

If the analyst is using Excel, she will choose the scatter (or XY) plot chart option in the "insert chart" menu. The analyst has the ability to differentiate products in the diagram; however, the more detailed is the differentiation, the more work involved. This guidance document suggests the analyst begin by differentiating only at the SITC section level (thus, 9-10 sets of products) but may want to chart at the division level (involving more than 50 sets of products).

Figure A.3



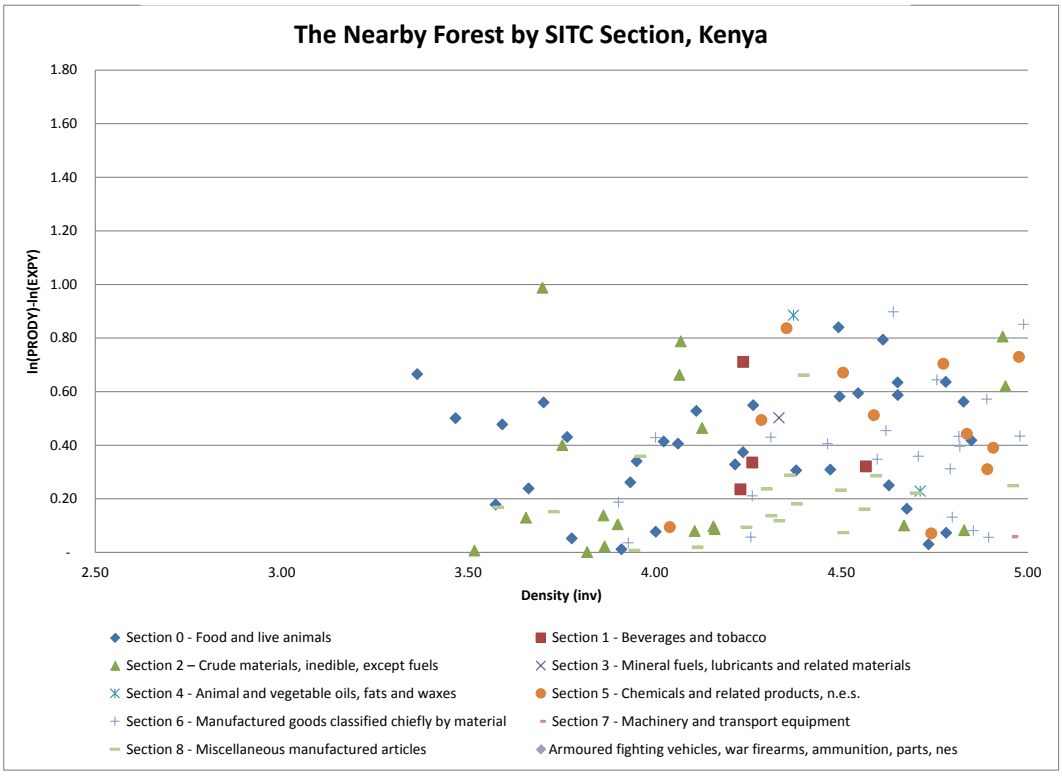
Each set of products defined by the analyst represents a new "series" in the Excel charting tool. Thus, if the analyst is disaggregating the information by SITC section, there will be 9-10 series in the Excel XY chart. Doing so results in the chart shown in figure A.3.

Step 4: Zooming into the Nearby Forest

Our goal is to identify the subset of products shown in figure A.3 that are both nearby and more valuable than the country's current comparative advantage basket. There is no explicit guidance on the range of inverse density values that constitutes "nearby". The analyst can use her best judgment in looking at the data and the scatter plot of products. For the Kenyan case presented here, we will define "nearby" products as those whose inverse densities are less than 5.0. A "valuable" product is defined appropriately as those products whose PRODY value is greater than the country's EXPY value, in the chart of figure 3, all products lying above the horizontal axis.

The analyst can easily reproduce the chart of figure A.3 for the Nearby Forest by making a copy of the chart within Excel and changing the axis value ranges within the "axis properties" menu item. The resulting Nearby Forest diagram is shown in figure A.4.

Figure A.4



The Nearby Forest depicted in figure A.4 shows all products to which, following the theory laid out by Hausmann and Klinger (2005), one would expect firms to have already been moving. These are products that are not very different from the country's current comparative advantage basket from the perspective of required inputs (physical and otherwise) and that represent relatively valuable opportunities.

Step 5: Identifying a short-list of products

The diagrams of figure A.3 and A.4 are useful as macro-perspective illustrations of Kenya's possible set of growth potential products. The analyst's end goal in this exercise, however, should be to identify individual products or sets of products (SITC 2-digit divisions) that would be the subject of HRV analysis. To do this we return to the presentation of data in spreadsheets.

To identify the products of the Nearby Forest, the analyst should create a filter of the spreadsheet created during step 2. The filter should narrow down the product list to only those whose density value is less than 5.0 (or some other limit defined by the analyst) and whose value for ln(PRODY)-ln(EXPY) is greater than zero. The analyst may want to copy the resulting table into a separate worksheet. A sample of the result for Kenya, products ranked in descending order of value, appears in figure A.5.

Figure A.5: Kenya's Nearby Forest, Table Form

The Nearby Forest, Kenya

SITC	Division	Product	**PRODY (20**	ln(PRODY	density (a	inverse
2681	26	Wool greasy or fleece-washed of sheep or lambs	21,274	0.99	0.270	3.70
6417	64	Paper and paperboard, creped, crinkled, etc, in rolls or shee	19,446	0.90	0.216	4.64
4111	41	Fat and oils of fish and marine mammals	19,193	0.88	0.229	4.37
6749	67	Other sheet and plates, of iron or steel, worked	18,561	0.85	0.200	4.99
224	2	Milk and cream, preserved, concentrated or sweetened	18,358	0.84	0.223	4.49
5121	51	Acyclic alcohols, and their derivatives	18,298	0.84	0.230	4.35
2881	28	Ash and residues, nes	17,730	0.81	0.203	4.93
541	5	Potatoes, fresh or chilled, excluding sweet potatoes	17,527	0.79	0.217	4.61
2682	26	Wool degreased, uncombed of sheep or lambs	17,414	0.79	0.246	4.07
5542	55	Organic surface-active agents, nes	16,438	0.73	0.201	4.98
1222	12	Cigarettes	16,128	0.71	0.236	4.24
5912	59	Fungicides, for sale by retail or as preparation	16,025	0.70	0.209	4.77
5621	56	Mineral or chemical fertilizers, nitrogenous	15,502	0.67	0.222	4.50
350	3	Fish, dried, salted or in brine; smoked fish	15,416	0.67	0.297	3.36
2925	29	Seeds, fruits and spores, nes, for planting	15,372	0.66	0.246	4.07
8931	89	Plastic packing containers, lids, stoppers and other closures	15,367	0.66	0.227	4.40
6732	67	Bars, rods (not wire rod), from iron or steel; hollow mining c	15,090	0.64	0.210	4.76
372	3	Crustaceans and molluscs, prepared or prepared, nes	14,971	0.64	0.209	4.78
819	8	Food waste and prepared animal feed, nes	14,941	0.63	0.215	4.65
2711	27	Animal or vegetable fertilizer, crude	14,741	0.62	0.202	4.94
484	4	Bakery products	14,354	0.59	0.220	4.55
481	4	Cereal grains, worked or prepared, not elsewhere specified	14,253	0.59	0.215	4.65
546	5	Vegetables, frozen or in temporary preservative	14,176	0.58	0.222	4.50
6624	66	Non-refractory ceramic bricks, tiles, pipes and similar produ	14,041	0.57	0.205	4.89
619	6	Sugars and syrups nes; artificial honey; caramel	13,907	0.56	0.207	4.83
814	8	Flours and meals, of meat, fish,etc, unfit for human; greaves	13,874	0.56	0.270	3.70
572	5	Other citrus fruits, fresh or dried	13,727	0.55	0.235	4.26
980	9	Edible products and preparations, nes	13,438	0.53	0.243	4.11
5231	52	Metallic salts and peroxysalts of inorganic acids	13,229	0.51	0.218	4.59
3330	33	Crude petroleum and oils obtained from bituminous materi	13,101	0.50	0.231	4.33
344	3	Fish fillets, frozen	13,080	0.50	0.289	3.47

Assuming that the sectors of focus for the subsequent HRV analysis would be of a more aggregate level than that represented by the 4-digit SITC code, the analyst would use the list of Nearby Forest products to identify SITC 2-digit divisions that are repeatedly cited. The analyst can use the COUNTIF function in Excel on the column of SITC division codes to rank divisions in descending order of appearance in the Nearby Forest.

Figure A.6 shows the number of appearances of each SITC division code in Kenya's Nearby Forest, ranked by number of citations, for only the most cited divisions. The most cited division of products is "articles of apparel and clothing accessories," followed by vegetables and fruit, cereals, textile yarn, and non-metallic mineral manufactures.

Figure A.6: Most Highly Occurring SITC Divisions in Kenya's Nearby Forest

Division	Count	Name
84	13	Articles of apparel and clothing accessories
5	10	Vegetables and fruit
4	6	Cereals and cereal preparations
65	6	Textile yarn, fabrics, made-up articles, n.e.s., and related products
66	6	Non-metallic mineral manufactures, n.e.s.
3	5	Fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates and preparations thereof
27	5	Crude fertilizers, other than those of division 56, and crude minerals (excluding coal, petroleum and precious stones)
6	4	Sugars, sugar preparations and honey
28	4	Metalliferous ores and metal scrap
89	4	Miscellaneous manufactured articles, n.e.s.

The top of the list in figure A.6 represents a "short list" of most-cited divisions from which one may choose 1-2 sectors of focus of HRV analysis. It is important to note, however, that the number of products that comprises any division is different across divisions. We may be more interested in focusing on divisions for which the greatest share of the division's products is represented in the Nearby Forest of figure A.5. Figure A.7 shows the 10 SITC division product groups with the greatest share of their products in the Nearby Forest.

Yet another perspective that can guide a ranking of Nearby Forest products is from the products' relative values. Figure A.8 shows a ranking of the top 20 most valuable divisions appearing in the Nearby Forest, the divisions' values taken as the average of PRODY values of their respective component products appearing in the Nearby Forest.

Figure A.7: Ranking of SITC Divisions by Representation in Kenya's Nearby Forest

Division	Count	%division	Name
21	3	27.3%	Hides, skins and furskins, raw
6	4	23.5%	Sugars, sugar preparations and honey
11	3	23.1%	Beverages
4	6	17.6%	Cereals and cereal preparations
56	3	15.8%	Fertilizers (other than those of group 272)
84	13	13.7%	Articles of apparel and clothing accessories
12	1	12.5%	Tobacco and tobacco manufactures
8	3	12.0%	Feeding stuff for animals (not including unmilled cereals)
27	5	11.1%	Crude fertilizers, other than those of division 56, and crude minerals (excluding coal, petroleum and precious stones)
9	2	11.1%	Miscellaneous edible products and preparations

Figure A.8: Most Valuable SITC Divisions in Kenya's Open Forest

Division	Count	%division	PRODY	Name
26	2	4.2%	0.89	Textile fibres (other than wool tops and other combed wool) and their wastes (not manufactured into yarn or fabric)
41	1	11.1%	0.88	Animal oils and fats
2	1	4.5%	0.84	Dairy products and birds' eggs
51	1	0.8%	0.84	Organic chemicals
67	2	1.5%	0.75	Iron and steel
55	1	3.8%	0.73	Essential oils and resinoids and perfume materials; toilet, polishing and cleaning preparations
12	1	12.5%	0.71	Tobacco and tobacco manufactures
64	3	4.8%	0.59	Paper, paperboard and articles of paper pulp, of paper or of paperboard
59	3	4.5%	0.53	Chemical materials and products, n.e.s.
33	1	6.7%	0.50	Petroleum, petroleum products and related materials
3	5	10.6%	0.49	Fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates and preparations thereof
57	1	1.9%	0.44	Plastics in primary forms
8	3	12.0%	0.42	Feeding stuff for animals (not including unmilled cereals)
29	3	9.4%	0.42	Crude animal and vegetable materials, n.e.s.
5	10	10.9%	0.41	Vegetables and fruit
52	2	2.5%	0.41	Inorganic chemicals
68	1	1.6%	0.41	Non-ferrous metals
69	1	0.9%	0.40	Manufactures of metals, n.e.s.
9	2	11.1%	0.39	Miscellaneous edible products and preparations
66	6	6.4%	0.37	Non-metallic mineral manufactures, n.e.s.

This document proposes no general rule on which measurement (a simple count, the share of the division's products, or division value) should be weighted more heavily in the identification of 1-2 sectors for HRV analysis. At this juncture the analyst should use her best judgment, keeping in mind that the production of division products should be intensive in the factors owned by the poor (usually, non-skilled or semi-skilled labor).

In this example for Kenya, not yet taking into account the factor intensity of production, "articles of apparel and clothing accessories," would make a good candidate for HRV analysis. It is ranked first for appearances in the Nearby Forest, with 14% of the division's components appearing (ranking sixth on this measure). The division, "sugars, sugar preparations, and honey," is ranked second overall on the share of its component products appearing in the Nearby Forest. It also appears in the top ten when ranked by simple count of appearances. The division, "cereals and cereal preparation," appears near

the top of both rankings, but may be too broad of a category for optimal use in the HRV exercise. Fish may be a good candidate, given its simple count ranking and its relatively high value as shown in figure A.7. Other less obvious, but possible, candidates include fertilizers (including crude fertilizers), feeding stuff for animals, and vegetables and fruit.

Step 6: Identifying Pro-Poor Products

As previously mentioned our goal is to choose (poor-owned-factor)-intensive sectors of focus for HRV analysis. Assuming that the poor-owned factor is labor, information such as the capital-labor ratio or the ratio of labor payments to total value added is often indicative of the level of labor intensity in each sector. The analyst is encouraged to survey the literature for such figures rather than conduct independent analysis.

As an example the author of this document uses a working paper by Tregenna (??) to evaluate the labor intensity of the short-listed sectors of this exercise. Tregenna creates a composite ranking of sectors based on a weighted average of labor-capital and labor-value added ratios. He ranks the products on the Kenya short list as follows:

Articles of clothing and clothing accessories:	2.0
Sugar, sugar preparations, and honey:	20.0
Cereals and cereal preparation:	10.3/20.0[15]
Fish:	10.3/20.0
Fertilizer:	10.3/37.0
Feed:	20.0
Vegetables and Fruit:	10.3

While little differentiation emerges between the majority of the list, it is clear that the SITC division "articles of clothing and clothing accessories" represents labor-intensive production. Given its labor intensity and its placement in the rankings in the previous discussion, the author of this document would choose clothing as a growth potential sector of focus for HRV analysis.

At most, one other growth potential sector should be chosen for HRV analysis. Any of the agricultural goods (whose composite labor-intensity rankings are 10.3) would be appropriate choices. The author chooses fish, given its relatively high average PRODY value.

In the end the analyst should understand clearly, and clarify to the reader, that the choice of sectors is, by no means, a promotion of sectors for possible support. The sectors are chosen for analytical

[15] Two figures are provided when the SITC trade classification corresponds to two different product classifications defined in the cited article. In this example the traded product can be either a raw agricultural product or a manufactured food product, production in the former being more labor-intensive than in the latter.

purposes only, as “case studies” to bring the aggregate HRV analysis down a micro-level that is more clearly linked to poor households. These case studies do not need to cover the entire economy. Rather they are providing examples of what is occurring at the sector level, whether or not the binding constraints identified by an aggregate analysis are the same constraints adversely impacting the advancement of sectors strongly linked to the poor.